



September 14, 1990

Project No. 302689

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Suite 2300
150 South Fifth Street
Minneapolis, MN 55402

Attention: Ms. Martha Brand, Esq.

Subject: Comments Related to the Selection of the Proposed Response Action
at the Arkwood (Omaha, AK) Site

Dear Ms. Brand:

At your request, we have completed an evaluation of the selection of the proposed "preferred remedy" for the cleanup of the Arkwood Site located in Omaha, Arkansas. File documents, reports and other information used in this appraisal are listed in Attachment No. 1.

The major objective of this evaluation is to judge the appropriateness of the proposed "preferred response action" for the affected soil and sludge. That proposed remedy is to incinerate those materials that contain: (1) chlorinated dibenzo-p-dioxins and/or chlorinated dibenzofurans that in the aggregate exceeded a dioxin "toxicity equivalence concentration" (TEC) of 20 micrograms per kilogram of soil (ug/kg), or (2) pentachlorophenol (PCP) exceeding a concentration of 300 mg/kg. (United States Environmental Protection Agency, Region VI [EPA-V]] Fact Sheet, July 1990) (U.S. EPA-VI Proposed Plan of Action, July 1990)

U.S. EPA Region VI used the proposed dioxin cleanup objective, which requires incineration of the soil/sludge if the concentration exceeds 20 ug/kg, at three dioxin sites in Texas (Davis Letter, June 27, 1990). These proposed Dioxin Cleanup Objectives were developed by the U.S. EPA in Region VII based on their experience at Times Beach and reviewed by the Agency for Toxic Substances and Disease Registry (ATSDR) (Johnson Letter, July 30, 1987).

It appears that a second part of U.S. EPA's decision to prefer incineration of the soil/sludge was based on a cleanup criterion for pentachlorophenol (PCP) of 300 milligram PCP/kg derived from the response objectives presented in the Feasibility Study (FS) (ERM, May 1990). The PCP cleanup criterion does not force a selection of incineration as the "preferred response action" by a set policy such as was used by the Agency for dioxin, but rather because it may be a permanent remedy that complies with the Superfund Amendments and Reauthorization Act (SARA) Section 121 requirement of reduction of toxicity, quantity, or mobility of the onsite toxic constituents.

It is our opinion that the selection of this remedy is not consistent with the National Contingency Plan (NCP) (55FR8666-8865) because: (a) a site-specific threat to the public health and welfare, and the environment has not been established by the Endangerment Assessment (EA) (ERM, August 1989), in that

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cumulative cancer risks do not fall outside the range allowed by CERCLA (10-4 to 10-6 excess upper bound lifetime cancer risk) (National Contingency Plan [NCP] 40 CFR 300.430 (e) (2) (i) (A) (2): 55FR8848, Federal Register, March 8, 1990) ; (b) it is not a cost-effective remedy; (c) the chemical-specific cleanup levels that are either applicable or "appropriate and relevant" for this site were not properly established.

The basic foundation for our conclusions are: (a) the use of an updated exposure scenario (soil ingestion rates now used by the U.S. EPA) and limiting the site to industrial use (precluding the exposure of children) to make the dioxin policy criterion specific to the Arkwood Site would result in a level that is above the dioxin equivalents estimated for the site material; (b) overall consideration of the toxicity of PCP in soil/sludge indicates a much higher (than 300 mg/kg) acceptable soil/sludge concentration; and (c) it was inappropriate to use linear regression to determine concentrations of carcinogenic Polycyclic Aromatic Hydrocarbons (c-PAHs) where all of the chemical analyses were non-detects in a medium that is heterogenous and does not necessarily follow a statistical central tendency.

It is important to note that the total excess cancer risks fall within the range listed in the NCP. Thus, this site is a good candidate for the lower end of the excess cancer risk range (1 in 10,000) in establishing the "to be considered" ARARs because it is in a remote location where there are few potential receptors (trespassers), and site remediation based on an industrial use exposure scenario was selected as the response action goal (Bondy letter of July 2, 1990). For these reasons, the chemical specific criterion for chlorinated dioxins and dibenzofurans ostensibly used to select the proposed "preferred remedy" (Davis Memorandum, June 27, 1990) is not specifically an "appropriate and relevant" requirement for this site. In the same context, the PCP cleanup level is not an "appropriate and relevant" requirement. A higher cleanup concentration is more appropriate with use of the latest chronic toxicity data, as will be explained later.

We present the following details for the above statements:

I. THE "PREFERRED REMEDY" IS NOT CONSISTENT WITH THE NCP

A. EPA's decision to select the incineration remedy is stated by Allyn M. Davis, Director of Hazardous Waste Management Division, U.S. EPA-VI in a June 27, 1990 Memorandum (Davis Memorandum, June 27, 1990). An attachment to the memo presented a matrix entitled "Consistency of Dioxin Standards" and showed Arkwood as a candidate for incineration of materials containing in excess of 20 parts per billion (ppb), and cover from 1 to 20 ppb. The only given reason was the nature of the site's geology.

"Arkwood - The proposed incineration approach was considered appropriate, because of the karst geology underlying the site." (Davis, June 27, 1990)

The selection of incineration was apparently based on the established regional policy criterion of 20 parts per billion (ppb) of 2,3,7,8 -tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) (the most toxic congener of dioxin) equivalents. The selection was made on that basis for the other dioxin sites listed in the Davis memo. It was bolstered by the possible need to treat materials containing PCP at concentrations that exceeded 300 mg/kg. The presence of c-PAHs were not considered in the selection because the dioxin was dictating the response action.

The Davis memo states that the proposed incineration approach was considered appropriate, because the karst geology underlying the site has some associated potential for a catastrophic event, namely a sinkhole could occur at any unpredictable time or location. This position was taken on the basis of the hydrogeologist's recommendation and evaluation of the site (Field Memorandum, July 3, 1990).

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The reported 2,3,7,8-TCDD equivalent concentrations used in the risk calculations (Rauscher Memorandum, July 6, 1990) and leading to the selection of the incineration remedy were:

Railroad Ditch: 62 ppb (Grid RC)
Main Site : 18 ppb (Grid B) 10 ppb (Grid TC)

A risk assessment was performed by Dr. Rauscher, the EPA-VI toxicologist (Rauscher Memorandum, July 6, 1990). Soil ingestion rates used for the chemical intake estimates were in accordance with the latest directive (Porter Memorandum, January 27, 1989). The results of this risk assessment are as follows (future use of the site is industrial):

Railroad Ditch: Total excess cancer risk (including c-PAHs):
Railroad personnel - 3 in 100,000 (3E-05)
Adults - 1 in 10,000 (1E-4)

Main Site: Adults (and children) - 8 in 10,000 (8E-5)

The above risks fall within the range allowed by the NCP. Thus, there is no need for an extensive and high cost remedy, such as on-site incineration, to slightly reduce the health risks associated with the dioxin and c-PAHs in the soil. This site is a suitable candidate for remediation to the lower end of the excess cancer risk range. Our preferred remedy of off-site incineration of the sludges will reduce the potential health risks below the minimum level required by the NCP. A "no action" alternative is not being sought.

Our interpretation of the U.S. EPA's actions, as reflected in the Davis Memo, leads to the conclusion that the 20 ppb criterion was not utilized at all for the main site since the 2,3,7,8-TCDD Equivalent did not exceed 20 ppb. Justification for incineration was based completely on the concern for sinkholes that might occur in the future that would drop the affected soil into the saturated zone (below the groundwater table). Thus, U.S. EPA appears to presume that the dioxin and PCP at the site could migrate from the site into a drinking water source. Backup for this position is given in Mr. Field's July 3 memo.

This rationale for selecting on-site incineration is fallacious. First, the probability of a sinkhole occurring is extremely low. Mr. Field (Field Memorandum, July 3, 1990) indicated that his review of site reports and aerial photographs indicate that sinkholes are not common in the area, although he stated that a sinkhole had occurred onsite in the past.

Second, even if a sinkhole were to occur, the dioxin and c-PAHs in the soil would not be released to groundwater because of their chemical nature. The log of the Octanol/Water Partition Coefficient (log Kow) is reported at 6.15-7.18 and the log of the Soil Adsorption (log Koc) is reported at 6.0-7.39 in the Toxicological Profile for 2,3,7,8-TCDD (ATSDR, 1989). Both of these chemical properties are indicative of an extremely immobile material in the soil environment. Solubility of this compound in water is reported at 0.00791 ug/l in the same document. In this context, the reason given for selecting incineration for dioxin cannot be defended scientifically and is not consistent with the NCP.

The same is true for PCPs. PCPs that have been in soils for a long time are also relatively immobile. Presuming that the PCP would leach at the rate predicted by the Organic Leachate Model (OLM) (51FR41088) and assuming a minimum attenuation predicted by the Vertical Horizontal Spread (VHS) Model (50FR48901), the procedure used to delist a sludge or waste that might be classified as a hazardous waste under RCRA, the concentration in the soil would have to exceed 31,000 mg/kg (based on a water solubility of 14 mg/l at 20C) to reach the

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reference dose equivalent level in groundwater. Also, PCP is very immobile in the groundwater regime. It will sink to the bottom of the aquifer and remain in place. It will not migrate from the site. Therefore, there is no basis for selecting incineration.

Furthermore, the EPA selected remedy of on-site incineration would result in expending considerable resources to treat materials that would not be considered hazardous under RCRA. The FS (ERM, 1990) determined that the purpose of soil remediation is to protect groundwater as a drinking water source. TCLP tests were run on soil samples and the conclusion resulting from the numerical analysis indicated that a soil concentration in excess of 330 mg/l would result in a leachate containing more than the RfD equivalent level of 1.0 mg/l. For purposes of classification as a hazardous waste displaying the Toxicity Characteristic (TC), the TCLP-Regulatory Limit has been set at 100 mg/l. The FS reported a soil sample containing PCP at a concentration of 2400 mg/kg (the sample with the highest PCP concentration that was tested) which generated a toxicity characteristic leachate showing PCP at 6.4 mg/l, far below the EPA's regulatory limit. In these circumstances, the Arkwood soil would not be a hazardous waste and could be processed at a landfill that does not meet the requirements of RCRA.

In summary, U.S. EPA proposes to incinerate soil at the Arkwood Site that is not considered to be a threat to groundwater under RCRA. No special site circumstances require such a remedy. Furthermore, the probability of a sinkhole occurring exactly at the location of the highest PCP concentrations at the site is negligible and the consequences of the event are minimal in the context of threat to the public health and welfare and the environment. The off-site incineration and capping remedy proposed in the FS will meet the statutory requirements and be consistent with the NCP in these circumstances.

B. The decision criteria used to arrive at the decision to incinerate the soils and sediments at the Arkwood Site are not "appropriate and relevant" chemical specific ARARs. Consequently, the possible remedy selection based on these levels will not be consistent with the NCP:

(1) The 20 ppb decision criterion noted in the U.S. EPA's June 27 memo is based on cleanup levels set for certain Missouri dioxin sites. Elaboration of the mathematics is given in Dr. Johnson's letter to Mr. David Wagoner (ATSDR, July 30, 1987), EPA-VII. EPA-VI utilized these criteria for their determination of the selected alternative at the Arkwood Site.

The 1987 letter shows that the calculation of cancer risk to support the 20 ppb cleanup level is based on the Kimbrough study (Kimbrough, 1984) that established a soil concentration of 1 ppb as the virtual safe dose level. The 20 ppb level is predicated on a ten inch clean cover that will reduce the exposure concentration to 1 ppb in case of an exposure. The virtual safe dose level of 1 ppb is for residential soil and is based on a child between 1.75 years and 5 years ingesting the major portion of the soil over a 70 year lifetime. Use of a child receptor at the Arkwood site is not "appropriate and relevant" because the EPA has decided to limit the future exposure scenario to one of industrial use, not residential. The total amount of soil ingested (applying the child soil ingestion rates used by Kimbrough to establish the 1 ppb virtual safe dose level) is over five times greater than estimated for an adult exposed over a 58 year period, the exposure duration used in the Arkwood site-specific risk assessment. This lowers the soil ingestion rate by five times. Because there is a direct proportional relationship between soil ingestion rate and the 20 ppb criterion (all other exposure factors being the same), the decision criterion for incineration should be increased by 5 times to 100 ppb of 2,3,7,8-TCDD equivalents in soil that is covered with 10 inches of clean fill. According to Dr. Rauscher's risk assessment, none of the area soils exceeded the 100 ug/kg level. Using this corrected criterion, an intensive

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remedy such as on-site incineration is not required to reduce the health risks to an acceptable level. The off-site incineration of the most affected sludges with capping of the remainder of the site is the most cost effective response action that meets the requirements of the NCP and SARA by reducing the quantity and toxicity of the remaining soil constituents.

(2) The RCRA Facility Investigation (RFI) Guidance (U.S. EPA, 1989) presents health-based parameters to be used to determine whether a corrective action is required. The health-based parameter for PCP in the soil ingestion (equivalent to the RfD) exposure scenario is 2,300 mg/kg rounded off to 2000 mg/kg. This is based on every day exposure of a 1 to 6 year-old child weighing 16 kg. ingesting 200 milligrams of soil every day for five years (dermal exposure not included and it is presumed PCP is the only chemical present).

Since this site has been designated for present and future industrial use only, the only receptor is an on-site worker who will ingest soil at half the rate and weights almost 4.8 times more than the child that was considered to set this criterion.

In the same context, because the site is considered for industrial use only, the on-site receptor exposure dose equivalent to the 1 mg/l used in the EA should be raised to 2.9 mg/l (a 70 kg on-site worker ingests 1 liter of water per day for 260 days per year, versus a 16 kg child drinking 1 liter of water every day). At the 2.9 mg/l level, the regression analysis curve of the TCLP leaching results would indicate that soil with a PCP concentration of 1050 mg/kg would meet this goal.

The site is to be remediated solely for future industrial use. A protective level for a soil ingestion scenario (based on the health risk assessment using the exposure scenario described in the risk assessment [Rauscher, 1990]) in which an adult is expected to be exposed to the site constituents 12 times per year, the PCP soil concentration has to be approximately 600,000 mg/kg to reach the reference dose concentration. This is not the case at this site, where the highest reported PCP concentration is 6,200 mg/kg (Sample No. R2C7 at the 1.2-2 foot depth). There is no concern for direct contact with the on-site soils.

Dioxin equivalents can not be evaluated for chronic toxicity (other than carcinogenicity). There is no available toxicological data associated with the congeners. Consequently, we cannot include the chlorinated-dibenzofurans in this analysis. PAH's have a moderate toxicity (the RfD for noncarcinogenic PAHs is set at 0.003 mg/kg/day). At the concentrations found in the soil and sediments at the Arkwood site, chronic toxicity contribution from PAHs would not change the above value significantly.

In summary, the soils at Arkwood do not need to be remediated to remove any chronic toxicity (other than carcinogenicity) hazards. The carcinogenic potency of the chemicals would be the controlling factor in any decision to remediate.

Selecting the incineration option would not be cost-effective, and would not significantly provide a greater risk reduction than the off-site incineration/capping alternative. On-site incineration would provide a greater degree of reduction of the volume and toxicity of the soil constituents, but this intensive and high-cost process is not necessary to protect the public health and the environment.. Off-site incineration of the sludges and capping of the remaining materials would meet the requirements of the NCP in a cost-effective manner and still be as permanent a remedy as is necessary and sufficiently health-protective.

C. As was previously stated, the decision criterion for dioxin was developed at the Times Beach site. It also considered the "matrix effect" of the soil on

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gastrointestinal tract absorption of dioxin at 40 to 60 percent. (McConnell, 1984), (Kimbrough, 1984). The source of the dioxin in the soil at Times Beach, Missouri was contaminated waste road oil that was sprayed on the soil. In this form it was not so strongly adsorbed to the soil particles, thus making it more bioavailable.

The age of the soil and the strength with which the dioxin and c-PAHs are adsorbed to the soil particles has a considerable effect on the bioavailability, or absorption of dioxin in the body. The absorption rate may be as low as 0.5 percent as reported by Umbriet (Umbriet, 1986) because of the soil matrix effect. Toxicity of dioxin was determined in animal studies (Kociba, 1978) in which the pure chemical was administered. The results of this study were used to establish the carcinogenic potency factor. Dr. Johnson (ATSDR, 1987) concluded that the original risk assessment that established 1 ppb of dioxin in soil as a safe level for residential soil used a 30 percent absorption factor, while later studies show this to be closer to 40 to 60 percent (McConnell, 1984). He concluded that the updated lower soil ingestion rates were offset by the updated higher absorption factors. This is not true. As discussed previously, the dose was overstated by five times. The materials at Arkwood are similar to those examined by Umbriet. These are soils that do not contain an oil solvent that could enhance the bioavailability of the chemical. Therefore, the 20 ug/kg criterion could be overstating the absorbed dose by as much as 30 times (30/60 [to decrease the overstatement due to the increased absorption] X 30/0.5 [due to the soil matrix effect]).

If we include all of the above considerations and make the criterion site-specific to Arkwood, the allowable soil concentration of 2,3,7,8-TCDD equivalent before incineration that is appropriate and relevant for the Arkwood site (or consistent with the NCP), could be as high as 3,000 ug/kg (30 [matrix effect] X 5 [lower soil ingestion rate] X 20 ug/kg [original criterion]). This is the site-specific criterion that is "appropriate and relevant" for the Arkwood site.

In conclusion, the decision criteria for both chlorinated dioxins and -dibenzofurans should be reassessed using the limited exposure scenario and latest absorption factors regarding exposure (soil ingestion rates of adults and site-specific soil matrix effects) and potential migration before being applied at Arkwood. The PCP chemical-specific ARAR should be made "appropriate and relevant" taking into consideration the TCLP Regulatory Limit of 100 mg/l. U.S. EPA cannot use a decision criterion that is inappropriate and not relevant to force MMI to implement a remedial response that is not consistent with the NCP.

The only justification given for selecting the incineration remedy is to prevent groundwater impacts mainly from PCP migration via infiltration and sinkhole occurrence. The probability of sinkhole occurrence, which is admittedly very low, and the minimal consequences of that occurrence must be realistically evaluated. In the above circumstances, selection of incineration is not consistent with the NCP because this action is not justified either from a health risk or cost standpoint. Since the material does not present a cancer risk that exceeds the range cited in the NCP and if the PCP concentration is set using the RCRA Regulatory Limit approach, the quantity of material actually requiring incineration will be drastically reduced. Thus, the cost of incineration will increase dramatically because mobilization costs for an on-site incinerator are a considerable portion of the cost and will not be reduced. Also, smaller onsite incineration units may not be able to attain the furnace temperatures needed to destroy dioxin like materials.

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II. A SITE-SPECIFIC THREAT TO THE PUBLIC HEALTH AND WELFARE, AND
THE ENVIRONMENT HAS NOT BEEN DEMONSTRATED BY THE EA
(Note: The FS reaches this same conclusion)

We have shown that the decision criterion which is cited by the U.S. EPA for the necessity of the on-site incineration remedy is erroneous in that it is not consistent with the latest U.S. EPA practices and policies. In addition, however, there are significant problems in the way that the Endangerment Assessment (EA) (ERM, August 1990) analyzed the specific data from the Arkwood site. As a result, the U.S. EPA has indicated their intent to choose a remedy that is not justified.

(1) The EA should have used half of the lowest reported detection limit for all of the non-detects to calculate the geometric mean and the "reasonable maximum exposure" concentration to estimate the chronic daily intake or dose in the risk characterization. All of the available and valid data should be used. In choosing the reported detection limit for the samples (in which the extract was diluted, thus necessitating a higher detection limit), non-detects were in some cases one to two orders of magnitude higher than the unqualified positive detection concentrations. Consequently, a reasonable maximum exposure or any mean value would be highly exaggerated.

(2) Anthropogenic levels of c-PAHs should be estimated based on the literature. Some of the reported values, if they were not obtained from the regression, could have been at background levels. The site may not be the source of some detected constituents.

(3) It should also be noted that the sampling protocol was a "biased" one in which only those samples that would be the most likely to contain the highest concentration of constituents (based on staining and color, and HNu readings) were analyzed. This type of sampling program would result in a biased data set that would not be indicative of a true normal or log-normal distribution where statistical methods could be meaningful.

(4) The EA did not consider soil constituent distribution, i.e. prevalence or the number of positive detection per number of samples that provides a measure of the probability of exposure. In examining the data base that appeared in the EA, we would characterize the constituent distribution patterns as one of some hot spots for the chlorinated chemicals and PCP, almost all in the surface soil horizon. Selective excavation, if it were found to be necessary, would reduce the volume of soil that required incineration making the offsite incineration alternative for a limited volume much more cost-effective and in keeping with the NCP.

(5) In one group of soil samples, there were no positive detections of c-PAHs, but values were derived from a regression analysis ((ERM Letter, May 18, 1990). In the above situation; e.g. a biased sampling program with high detection limits, the perceived cancer risks would be based strictly on derived rather than observed data. The c-PAHs in this case should have been considered to be non-prevalent and not included in the calculation of cancer risks. The uncertainty regarding the presence or absence of c-PAHs should have been noted.

All in all, the health risks at the Arkwood Site fall within the permissible range allowed by CERCLA. If properly analyzed, the EA has many conservative elements included in the determination of constituent concentrations. An appraisal that included lower detection limits, considered the prevalence of the constituents and anthropogenic levels for the c-PAHs could result in estimated cancer risks that reach the departure point of one in a million. This more realistic approach

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supports the selection of the off-site incineration/capping alternative which is consistent with the NCP and SARA.

III. CAPPING IS CONSISTENT WITH THE NCP AND IS COST EFFECTIVE

Capping, as a selected remedial response, is consistent with the NCP because it will reduce the migration potential of the soil PCP and, for dioxin and c-PAHs that contribute all of the cancer risk, the direct contact exposure pathway will be eliminated. There is no migration potential associated with these compounds due to their chemical characteristics (low water solubility, non-volatility, and high soil absorption coefficients).

As stated earlier, the on-site incineration remedy was selected not to protect public health in the case of exposure to soil constituents as the decision criteria of 20 ppb was designed to prevent, but to prevent groundwater impacts mainly from PCP migration via infiltration and sinkhole occurrence. But, in the unlikely event of the occurrence of a "sinkhole" and physical movement of the affected soil to the saturation zone, the dioxin, c-PAHs and PCPs would not migrate in the groundwater. Catastrophic sinkhole development has a minimal probability of occurring at the most critical locations based on the site geology (as evaluated from available data by Mr. Field). Repair can be accomplished rapidly with potential for prevention of direct contact exposure which would last for only hours or days before repairs are effected.

The incineration remedy selected by the U.S. EPA for the site is not cost effective as required by CERCLA. There is some uncertainty regarding the predicted costs since auxiliary fuel would be required and oil prices have risen significantly.

The sludge incineration/capping remedy proposed in the FS would meet the small threat to the public health and the environment associated with exposure to the site constituents. The requirements of the NCP for reduction of toxicity and mobility would be met, the chances of failure of the remedy are low, and an adequate degree of permanence would be achieved by implementing this remedy.

III. THERE IS SOME CONTROVERSY REGARDING THE CARCINOGENIC POTENCY OF DIOXIN. We recognize the need for the Agency to be prudent in its actions when considering a modification of the toxicity parameters. Therefore, based on the on the trend of scientific study in the field, we present the following:

A. Carcinogenic potency of dioxin was determined using data from an animal study by Kociba (Kociba, 1978) and reanalyzed by Squires (Squires, 1980). Responding to internal and external questions about the U.S. EPA's Health Assessment Document (HAD) for Dioxin (U.S. EPA, 1985), a committee produced a report "A Cancer Risk-Specific-Dose Estimate for 2,3,7,8-TCDD" (U.S. EPA, 1988), with the intention of changing the risk specific dose (RsD) from 0.006 picograms/kilogram of body weight/day to 0.1 pg/kg/day. This was a reduction of the carcinogenic potency factor of 16.67 times. EPA eventually chose not to change the RsD. A comparison of RsDs used by other agencies and countries will illustrate the range of values being used for regulatory purposes:

U.S. Environmental Protection Agency	0.006 pg/kg/day
Centers for Disease Control (CDC)	0.028
Food and Drug Administration	0.057
Federal Republic of Germany	1-10
Great Britain	10
Denmark	5
The Netherlands	4
Canada	10

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The above shows the range of values that each of these entities consider to be a virtual safe dose. The differences may be due to the selected carcinogenic potency factors that are derived using different protocols, or the level of conservatism dictated by policy in the assessment process. All of the above values are cited in Houk (Houk, 1990). Dr. Houk indicates that CDC is considering a RsD of 0.25 pg/kg/day. However this is based on using body weight instead of surface area in extrapolating animal results to humans, and not using benign tumors observed in the Kociba study.

In addition to all of the above, there is some question whether the high doses administered in the animal studies (that exhibited cytotoxicity) may enhance the formation of malignant tumors. (Ames, 1990) (Science, August 8, 1990). Also, there are some scientists who believe that dioxin (in particular) does have a threshold.

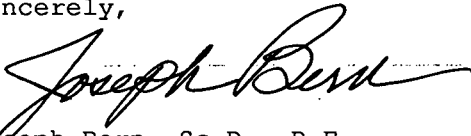
B. The whole question of toxicity of dioxin is being questioned by Dr. Vernon Houk, M.D., Assistant Surgeon General and Director of the Center for Environmental Health and Injury Control in his testimony before the U.S. Congress. We have spoken to Dr. Houk. He has indicated that the animal study used by U.S. EPA is flawed because some of the reported tumors did not fulfill the definition of a carcinogenic response as defined by the International Agency for Research in Cancer (IARC) and the National Cancer Institute (NCI). Also, additional epidemiological data gathered since 1987 appears to support the fact that there is a threshold for carcinogenic response due to exposure to dioxin. (Houk, 1990)

The implication of the above is that the Slope Factor (SF) or Cancer Potency Factor (CPF) is probably overstated by some 89 times, and the model used to establish dioxin as a carcinogen at low doses may be too conservative. AT THE DIOXIN LEVELS FOUND IN THE SOILS AT THE ARKWOOD SITE, EXPOSURE WOULD NOT BE EXPECTED TO RESULT IN A HEALTH CONSEQUENCE BECAUSE IT WOULD BE BELOW A THRESHOLD.

Although it appears that the TECs for the chlorinated dioxins and -dibenzofurans do not play a critical role in the response action decision, we believe the above presentation provides some perspective for utilizing the risk assessment.

In conclusion, we believe that selecting incineration of 20,000 cubic yards of soil due to the presence of PCP to prevent groundwater impacts is not "appropriate and relevant" for this particular site for the reasons stated above.

Sincerely,



Joseph Bern, Sc.D., P.E.
Distinguished Technical Associate
INTERNATIONAL TECHNOLOGY CORP.

cc: Mark Norgaard, IT-St. Paul

ATTACHMENT 1.

Our evaluation of the Arkwood Site used the information included in the following documents in the order in which they are cited in the report:

- * U.S. Environmental Protection Agency (U.S. EPA) Region VI. July 1990. FACT SHEET. Proposed Plan of Action at the Arkwood, Inc. Superfund Site, Omaha, Arkansas.
- * U.S. Environmental Protection Agency (U.S. EPA) Region VI. July 1990. FACT SHEET. Preferred Remedy for the Arkwood, Inc. Superfund Site, Omaha, Arkansas.
- * U.S. EPA-VI. MEMORANDUM. June 27, 1990. FROM: Allyn M. Davis, Director, Hazardous Waste Management Division (6H). TO: Henry L. Longest, Director, Office of Waste Programs Enforcement (OS-500) and Bruce M. Diamond, Director, Office of Waste Programs Enforcement (OS-500).
- * ERM-Southwest, Inc. May 23, 1990. Feasibility Study. Arkwood, Inc. Site. Omaha, Arkansas. Volume I. Prepared for: Mass Merchandisers, Inc.
- * Federal Register (FR). March 8, 1990. 40 CFR 300. National Oil and Hazardous Substance Pollution Contingency Plan (NCP); Final Rule. FR, Volume 55, No. 40, March 8, 1990, pp. 8666-8865.
- * U.S. EPA-VI. MEMORANDUM. July 2, 1990. FROM: Garret Bondy, Chief of AR/LA CERCLA Enforcement Section (6H-EA). TO: Dr. Jon Rauscher, PhD., Branch Toxicologist, CERCLA Programs Branch.
- * Malcolm S. Field, Hydrogeologist, Exposure Assessment Applications Branch, Exposure Assessment Group (RD-689). TO: Brent Truskowski, Remedial Project Manager AR/LA CERCLA Enforcement Section (6H-EA) Region VI.
- * U.S. EPA-VI. MEMORANDUM. July 6, 1990. FROM: Dr. Jon Rauscher, Toxicologist, Texas Remedy Section to Brent Truskowski, Remedial Project Manager AR/LA Section. SUBJECT: Upper Bound Excess lifetime cancer risk and remediation goals for the Arkwood Superfund site.
- * U.S. EPA Headquarters (WDC). MEMORANDUM. January 27, 1989. FROM: J. Winston Porter, Assistant Administrator. TO: Regional Administrators' Regions I-X. SUBJECT: Interim Final Guidance for Soil Ingestion Rates.
- * Agency for Toxic Substances and Disease Registry. February 1989. Toxicological Profile for 2,3,7,8-TETRACHLORO-DIBENZO-p-DIOXIN. Draft. U. S. Public Health Service.
- * Federal Register. November 13, 1986. Environmental Protection Agency. 40 CFR Part 261. Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Final Exclusion and Final Organic Leachate Model (OLM).
- * Federal Register. November 27, 1985. Environmental Protection Agency. 40 CFR Part 261. Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Final Rule and Proposed Rules. 50FR48901 Federal Register, Volume 50, No. 229, November 27, 1985.

- * Agency for Toxic Substances and Disease Registry. July 30, 1987. LETTER. FROM: Dr. Barry L. Johnson, Ph.D., Associate Administrator Agency for Toxic Substances and Disease Registry. TO: Mr. David Wagoner, Director of Waste Management Division, U.S. EPA Region VII.
- * Umbreit, T. H., Hesse, E. J., and Gallo, M. A. Science, Volume 232 (1986), pp. 497-499.
- * Kimbrough, R. D., Falk, H. and Stehr P. 1984. Health Implications of 2,3,7,8-Tetrachloro-Dibenzodioxin (TCDD) Contamination of Residential Soil. Journal of Toxicology and Environmental Health, Vol.14, pp. 47-93.
- * U.S. EPA. May 1989. Interim Final. RCRA Facility Investigation (RFI) Guidance. Volume I of IV. Development of an RFI Work Plan and General Considerations for RCRA Facility Investigations. EPA 530/SW-89-031 (OSWER Directive 9502.00.6D). Waste Management Division, Office of Solid Waste, U.S. EPA, Washington, D.C.
- * McConnell, E., et. al. 1984. Dioxin in Soil: Bioavailability After Ingestion by Rats and Guinea Pigs. Science, Vol. 223, pp. 1077-1079.
- * ERM-Southwest, Inc. August 30, 1989. Endangerment Assessment. Arkwood, Inc. Site. Omaha, Arkansas. Prepared for: Mass Merchandisers, Inc.
- * Amendment to the Feasibility Study, Attachment forwarded to Mr. Brent Truskowski, U.S. EPA-VI on May 18, 1990 by Richard H. Fuller, P.G. of ERM-Southwest, Inc.
- * Kociba, R.J. et. al. 1978. Results of a two-year study of 2,3,7,8-tetrachloro-dibenzo-p-dioxin in rats. Toxicology and Applied Pharmacology. Volume 46, pp. 279-303.
- * Squires, R. A. August 15, 1980. Evaluations of Selected Tissues from the Dow Chemical TCDD and 2,4,5-T Rat Studies, Contract 68-01-5092. Submitted to the Carcinogen Assessment Group, U.S. EPA, Washington, D.C.
- * U.S. EPA. June 1988. Draft. A Cancer Risk-Specific Dose Estimate for 2,3,7,8-TCDD. EPA/600/6-88/007A. Office of Health and Environmental Assessment. Washington, D.C.
- * Testimony by Vernon N. Houk, M.D., Assistant Surgeon General. Director, Center for Environmental Health and Injury Control, Centers for Disease Control. Public Health Service. U.S. Department of Health and Human Services, Atlanta, Georgia before the Subcommittee on Human Resources and Intergovernmental Relations Committee on Government Operations, House of Representatives on July 26, 1990.

Other documents reviewed but not cited in the Report.

- * Remedial Investigation Report. Arkwood, Inc. Site. Volume II. Appendices C - H. Prepared for: Mass Merchandisers, Inc. by ERM-Southwest, Inc. Dated March 30, 1990.
- * Feasibility Study. Arkwood, Inc. Site. Omaha, Arkansas. Volume III: Appendix C - Treatability Study Report. Prepared by ERM-Southwest, Inc. Dated March 30, 1990.

- * U.S. EPA Region 6 MEMORANDUM dated July 5, 1990 from Garret Bondy, Chief AR/LA Superfund Enforcement to the files.
- * Part II. Update to the Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and -Dibenzofurans (CDDs and CDFs) (U.S. EPA, 1989)